STRATEGY RESEARCH PROJECT

SYSTEM SYNERGISM FOR XXI CENTURY LOGISTICS

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ABSTRACT

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As resources are constrained, large inventories and the American tradition of logistics by overwhelming volume will become things of the past. Force projection concepts will increase the already intense competition for strategic and tactical lift. Modern business practices and technology point to centralized management and distribution hubs. This paper argues the current concepts being developed for logistics are evolutionary and piecemeal because of bureaucratic stagnation and interagency competition. The logistical success of the Gulf War masked underlying structural problems and failed to incorporate advances in technology in the management of distribution. Revolutionary, rather than evolutionary approachs are necessary in developing constructs for operational logistics. This revolution needs to be driven by joint doctrine and leadership, applying commercially available technology and systems to replace our existing architecture.

As resources are constrained, large inventories and the American tradition of logistics by overwhelming volume will become things of the past. Force projection concepts will increase the already intense competition for strategic and tactical lift as more and more forces are moved from forward theaters back to the United States. Modern commercial business practices and technology point to centralized management and distribution hubs.

Current concepts being developed for logistics are evolutionary and piecemeal, in large part, because the bureaucratic stagnation and interagency competition pointed out by recent GAO reports. The logistical success of the Gulf War masked underlying structural problems and failed to incorporate advances in technology in the management of distribution. Revolutionary, rather than evolutionary approaches are necessary in developing constructs for operational logistics, and this revolution needs to be driven by joint doctrine and leadership. This might take the form of combining the functions currently performed by USATRANSCOM with the supply functions of the separate services under a single supporting CINC. The CASCOM thought piece proposing a Joint SUPCOM in the Operational area needs to be implemented, as do initiatives for combining transportation and supply into single distribution management at the tactical level. Finally, we need to develop joint logistical systems and doctrine that achieve battlefield synergism.

This paper will be divided into six parts. First, a brief look at the history of logistics and where we are now. Second, a proposal of a model for conceptual examination of our needs. Third, a look at technology and its implications. Fourth, a review of commercial concepts (i.e.., hub and spoke distribution) and what they have to offer. Fifth, examination of current initiatives and an argument to rapidly accelerate adopting them and increasing their scope. Finally, a conclusion that offers encouragement and caution as we plunge into the 21st century.

I. History and where we are today.

During America's first force projection war, The Spanish - American War, the Havana harbor was so clogged with ships that mules were pushed overboard with cargo strapped to their sides in the hopes they would swim it to shore. Despite the many advances in logistics made over the next ninety years, similar port clearance problems were encountered in World War II and Vietnam. During the Gulf war, over 22,000 containers had to be opened to determine their contents as ports were clogged with material and containers. The same problems were encountered when the cargo was retrograded; the resultant loss in Class IX alone amounted to over 2.7 billion dollars as stock was sent to Property disposal yards or damaged by improper storage.

The same stories are told by veterans of every conflict in this century. In many cases, warfighters were forced to send scavengers from their units to supply bases, where they were allowed to take anything they needed - if they could find it. Our success in logistics was solved not as much by systematic distribution as it was by the ability of the seemingly unending ability of the American economy to push every imaginable type of supply forward, in quantities sufficient to overcome even the largest logistical challenge.

We no longer can afford this. Limited budgets and downsizing are juxtaposition against the incredible cost of modern warfighting systems and spares. Logistics units are being downsized in anticipation of technological advances. This, coupled with an aging C-141 fleet and reduction in participation in the CRAF have made the Herculean efforts of the past prohibitively expensive and perhaps logistically impossible. Huge stockpiles accumulated during the cold war have not been replenished. Loss of stock at the ports is unacceptable in an age of a finite

industrial base. As the Army develops its XXI Century Force, logisticians are faced with the

prospect of solving these problems or facing the prospect of facing their first failure in modern

times.

Recent reports by the Government Accounting Office cite the military transportation

system as "...inefficient. You have multiple organizations, processes that are fragmented,

resulting in a higher cost of transportation than is necessary."[1] NBC's Bob Kur says logistics

management "...amounts to a tangle of redundancy and red tape."[2] Rand Corporation sees the

Army Distribution as complex and segmented, a linear process that passes thru multiple nodes of

different organizations, as illustrated in Figure 1.[3]
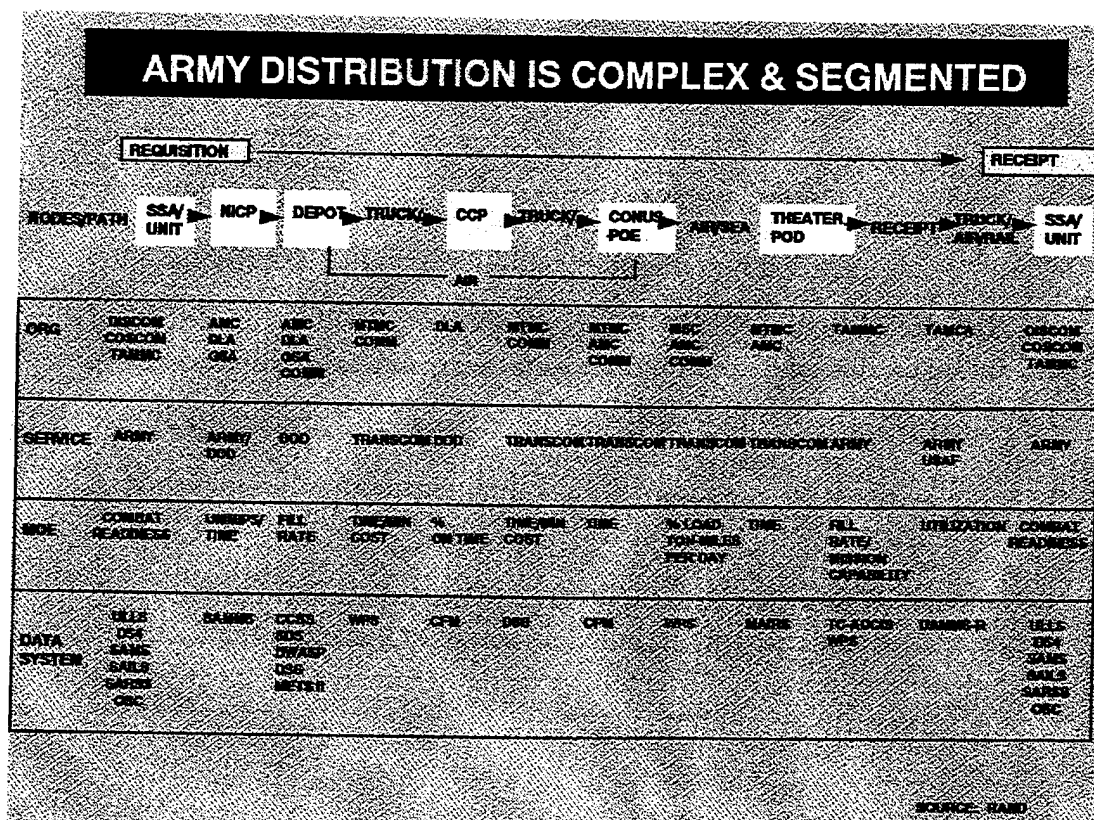
This chart, prepared by the author's team at CASCOM, graphically illustrates the problem with multiple organizations controlling nodes of a linear system. Each segment of the system looks to its own node for efficiencies without regard to the impact on the system as a whole. Separate, unrelated organizations develop non-compatible management structures and information systems. An unnamed source during the "Fleecing of America" segment blames "turf protection, every service wanting their own piece of the pie, and then of course you have members of Congress, who are out to protect whatever operation they have in their own districts."[4] Agencies and nodes have evolved and multiplied since World War Two to support large deployments on a linear battlefield. Redundancies and nodes with large stockpiles were built to support an unsecured bases and LOCs for the active defense doctrine of the 70's. With the advent of force projection doctrine and the development of the multidimensional battlefield, we need to stop the evolutionary process and instead look to a revolution in military logistics to match the revolution in military affairs as we approach the 21st century.

II. Model for Conceptual Development

Admiral William A. Owens, in his recent article "The Emerging Systems of Systems," proposes that we accelerate the current Revolution in Military Affairs. He sees a window of opportunity for the next decade, created by a reduced threat, that offers the opportunity to transfer resources from maintaining current systems to focus resources on technological development. His paper outlines a broad conceptual strategy which focuses on achieving systems synergism by developing an increased appreciation for joint operations and common military doctrine. He argues that we have an opportunity during a period of diminished threats to be bold, innovative, and creative.

Paul G. Kaminski, Undersecretary of Defense for Acquisition and Technology, has expressed a need for a "complementary vision for logistics concepts"[5] to support the revolution in military affairs. His vision mirrors Admiral Owens in calling for major systems integration and identifying dominant battlespace awareness. He sees responsive logistics support as key to operating within an enemy's decision cycle. Like Admiral Owens, he lists enabling information technologies that contribute to producing the overlap.

It is important to note that both Mr. Kaminski and Admiral Owens recognize the importance of systems integration - the "System of Systems." Both see Total Asset Visibility as essential for achieving Battlespace Awareness. Mr. Kaminski calls upon warfighters, logisticians and the industrial base to more precisely define and shape this broad vision.

Can Admiral Owens' concepts and proposals be more specifically applied to military logistics? Are logisticians faced with the same challenges and opportunities as the broader military at the joint level? Can the same broad conceptual architecture outlined in achieving systems synergism be used as a model for the current revolution in military logistics?

Admiral Owens offers a list of thirty systems in or entering the military that, by providing accuracy, effectiveness and minimum risk form the technological basis for each of the service's current visions. Although subsumed under the three headings of Sensors, C4I (Command, Control, Communication and Computer Integration) and Programmed guided missiles, later in the article he offers the more general headings of battlespace awareness, C4I and precision force use. Given those general parameters, it becomes possible to construct a similar list for logistical systems:

Battlespace Awareness	C4I	Precision Force Use
TAV	CSSCS	NUCOM
JTAV	SARRS-O	OMNI-TRACK
RF/AIT	TAMIS	GRENADIER BRAT
AMS	DAMMS-R	AMX
MROCS	SAAS	MTS
LOGMARS	STARS	GPS
CAPS 2	GTN	COMBAT TRACK
LIPS	DSS	PLS
LIF	SDS	C-17
WPS	SAMS	PREPO AFLOAT
AGILELOGS	SALTS	OSC

Many of you will not know the esoteric acronyms of the logistics world - those who do may well argue that I have categorized some of them incorrectly. Indeed, some of these encompass more than one system. Nor is the list all inclusive - many others could be included. In fact, 55 separate automation systems are used for materiel and maintenance management. What is important, however, is that they represent years of work and effort among the separate services to develop systems to meet the needs of their particular enterprise. The nodal nature of today's logistics system sees each agency, service, office and corps working hard to develop these systems to serve their own piece of the logistics system. Fostered by the PPBS structure, their efforts have been compartmentalized into MDPS in order to improve the efficiency of their slice of the logistics pie.

As we study each of these systems individually, however, we begin to recognize that each offers in some way a different approach to a common solution - indeed, in many cases, we find

that they have independently arrived at the same solution set. Just as with combat systems, however, their real power - the revolution in military logistics - occurs when they are tied together as a system of systems.
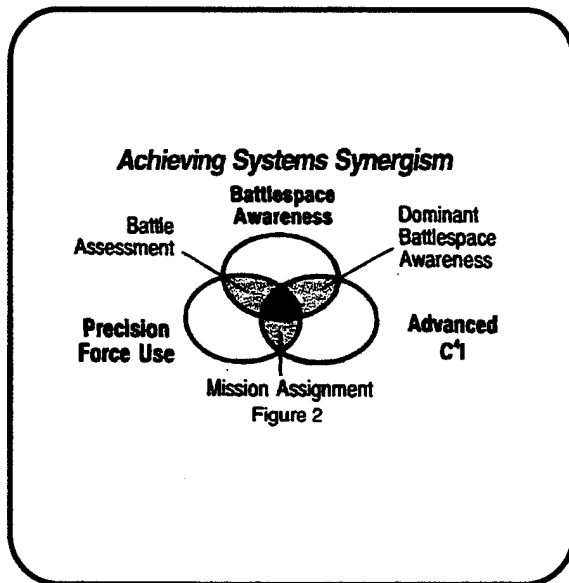
It is useful at this point to examine Admiral Owens' model for achieving system synergism. Figure 2[6] graphically illustrates his concept. His three major parameters can be defined in logistics terms, as follows:

Achieving Systems Synergism

Battle Assessment

Battlespace Awareness

Dominant Battlespace Awareness

Precision Force Use

Advanced C⁴I

Mission Assignment

Figure 2

Battlespace Awareness focuses on sensing and reporting technologies. The problem in logistics terms, is rather simple - what is it, where is it, and when is it coming? It is instructive that Admiral Owens specifically mentions in-transit visibility as a key function of battlespace awareness. One issue, often misunderstood in defining battlespace, is it's size and audience. For the warfighter, his area may be 200 kilometers square - for the logistician, the depth reaches back to item's source - in some cases, half way around the world. The audience is primarily the warfighter: however, each of the nodes in the pipeline need the same awareness to properly plan and execute their mission. Location of units, both customers and logistics units, are key. Pre-alert information (when is it coming?) is important to properly plan workloading and onward movement.

Advanced C4I involves the transfer and organization of data to produce meaningful information. In the case of logistics, the power of the technology rests on the identification of

commodities and their reconfiguration to be rapidly distributed to the target. It takes the raw data provided by battlespace awareness and transforms it into action.

Precision Force Use is the ability to provide the logistics "fire hose" - the rapid, accurate, and reliable delivery of materiel to the warfighter. This becomes particularly important as we redefine the linear battlefield into a fluid, three dimensional paradigm. It is perfectly defined in the FedEx mission statement:

> "Federal Express, based on a strong adherence to its People-Service-Profit philosophy, is dedicated to maximizing financial returns by providing totally reliable, competitively superior, global air-ground transportation of high priority goods and documents that require rapid, time-certain delivery."[7]

The ability to act before an enemy can act, to achieve dominate battle cycle time in Mr. Kaminski's definition, or operate within an opponent's decision cycle, is created when there is overlap between the three outer circles. The center of the Venn diagram represents the synergy, the "System of Systems," that we are trying to create. The larger this area, the more effective we become. How can logisticians develop this synergy? Admiral Owens, one might expect, would argue that it belongs in the joint arena, drawing on technologies found in the non-defense, commercial sector.

Today's logistics is a highly segmented, linear architecture. Each node of the system focuses on increasing it's own efficiencies without regard to overall system performance. Ultimately, command and control is exercised by complex financial arrangements programmed by the PPBS system.

The result is the plethora of systems found in the above table. With few exceptions, each is designed to increase nodal efficiency. Not only have individual services fielded redundant systems, there remain unique systems for individual classes of supply within the services

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themselves. Although some efforts at coordination and cooperation have been and are being made, they are the exception rather than the rule. For the warfighter, a mix of systems is desirable; for the logistician, it creates confusion and chaos. Given this diverse state of affairs, development of synergy is difficult, if not impossible. We need to reduce the list to a few interoperable joint systems - not try to continually piece together what has been independently developed. Using Admiral Owens model, then, development of joint, interoperable systems leading to system synergy should be approached by finding common systems to solve the following common challenges:

Battlespace Awareness	C4I	Precision Force Use
In transit visiblity	Assured Comms	Mobile Tracking System
Total asset visibility	Source data automation	Direct Delivery
Automatic identification technology	Single STAMIS	Joint Lateral Distribution

Admiral Owens model offers us a conceptual construct toward development of joint, interoperable systems leading to system synergy. This synergy, once achieved, can lead naturally toward a revolution in military logistics.

III. Technology

MAJ Harry Jones pulls his logistics operations vehicle away from the C-17 that has just landed in Loggieland. As part of the initial force projection, His corps' flyaway team is concerned about tracking the flow of supplies thru the Aerial Port of Debarkation (APOD). He has his driver move to the cargo storage yard. Sitting in the back of his modified com shelter, he begins reading the Radio Frequency (RF) tags attached to the air pallets scattered around the airfield. He takes his cursor to the bottom of his computer screen and types "Mobile Hub." Two tags report back. He then downloads detailed information from the two tags. All of the equipment has arrived - now all he needs is the personnel. Thru the vehicle's internal INMARSAT phone he transmits the information stored in his interrogator's computer to the stateside data base. He then sends a requisition that was waiting for him as he got off the plane directly to the ST. Louis Objective Supply Capability (OSC) Gateway . Shortly afterwards, OSC tells him that the cargo is in country. He checks Total Asset Visibility's (TAV) RF tag data base and finds it has just left

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Ramstein - An hour later, when the plane lands, he sees the pallet pass the interrogator his men have just set up at the cargo off load area. He pulls a hand held interrogator from the charging rack and asks one of his men go out and scan the pallets. Using the hand held's direction finder, He locates the pallet, and sets off the tag's audible beeper. The beeping pallet is pulled away from the rest of the cargo and put on a small truck for immediate delivery.

About an hour later, a C-130 lands. Shortly afterwards, a captain carrying a briefcase comes up to the back of the van. "I'm Captain Smith, commander of the mobile hub team. Found your interrogator position in the data base download we did when we got off the plane - looks like our pallets are already here. Amazing you can do all that with INMARSAT and a computer in a briefcase, isn't it?" The contracting officer from the Logistics Support Activity (LSE) has already found a nearby warehouse, rented some MHE, trucks, and hired local laborers. Several Supply Support Activities (SSA) arrive. After MAJ Jones team finds their pallets with hand held interrogators, they load them on the contracted trucks and move out to their locations, guided by Global Positioning System (GPS). As the trucks go past, MAJ Jones turns on his RF interrogator to download the pallet's tags to indicate the departure of the material from the APOD. While his men are setting up interrogation units on tripods on the airfield, he tracks the convoy with his Mobile Tracking System. Each of the SSA convoys is a color coded moving dot on the computer's map overlay.

Captain Smith starts organizing the off load of his equipment at the hub he has set up in the contracted warehouse. "Nice to have a roof overhead," he mumbles, as he watches his men pull Automated Manifest System (AMS) cards off the pallets and feed them into the Standard Tracking and Redistribution System (STARS) computer. Within minutes, the computer spits out the most efficient way to redistribute the breakbulk cargo and assigns it to the truck best suited to carry it. His men and the contracted laborers are already attaching new card and RF tags to the pallets. "Some of this cargo is for units that aren't here yet - we'll have to hold it" his NCOIC barks as he waves his arms to intercept one of the forklifts. Captain Smith opens his briefcase and makes a few keystrokes. "Don't worry - they're coming tonight -keep the pallets on the floor," he hollers as he looks around for the pallet with his personal gear.

After the RF systems are set up at the APOD, MAJ Jones decides to set up his onboard regional server, a 586DX 133 with 32 MB of RAM. Eventually, this will grow into a network of a dozen of so other servers as they arrive in theater. Looking at his Mobile Tracking System (MTS), he sees that his SSA's are setting up only a few miles away. He sends an e-mail and tells them to switch from INMARSAT to wireless modem. Within a few minutes all units have responded to the com switch, but one is coming in weak, so he has him switch to cellular telephone. "Amazing that third world countries have skipped a whole step in technology and developed cellular telephone systems" he muses. Figuring that the units will be stationary for the next day or two, he tells them to shut down mobile tracking, but make one INMARSAT burst at 1200 hrs to confirm transmissions and establish location via INMARSAT'S GPS location identifier. He sets his server to batch INMARSAT transmissions every six hours back to CONUS to update current status .

"You have mail" pops up on the bottom of the screen. Minimizing one window, he pulls up an E-mail from Corps headquarters back in the States - one of the relief agencies trucks carrying blood has broken down, and needs an injector pump. A quick search thru a CD ROM converts the parts number to NSN. "A Chevy's a Chevy" he thinks as he does a quick search over his net. One just left the hub. Pulling up the TCMD, he sees that it's on a military truck. "No sweat on this one" as he tabs to MTS. He finds the truck carrying the part, and sends it a message redirecting it to the downed vehicle. That'll upset the folks at the SSA, but that's what an MMC does - sets priorities. He quickly sends an E-mail with an apology to the SSA.

LT Jones at the SSA is bemused. Since the advent of MTS, this sort of thing happens. She opens his system's chat line, and types, "Hey Major, can I deduct this from my taxes as a charitable donation?" Seeing the message pop up on the bottom of his screen, MAJ Jones fires back a polite "very funny," and pulls up TAV to find the replacement pump...

None of the systems in this scenario are new - all are in current use, either in the military or civilian sector. What has not been done is put them together in any kind of coherent fashion. Nor do we know how to use their power to improve our approach to business practices. The Toffler's point out in their recent book, War Anti War, that we have a limited understanding of the impact of the information age on logistics. In comments solicited for this paper from CASCOM's Battlelab, one officer likens current efforts as building a house without an architect. The author's personal experience with fielding in-transit visibility systems pointed to a lack of understanding of developing system architecture and the importance on the part of contractors to understand the logistics system. Nor are systems "Plug and Play." Radio frequency tagging, the Army's centerpiece for In-transit visibility, has been around for several years - yet, because of lack of coherent fielding plans and training we are forced to rely on contractors to establish and maintain the systems.

Both Admiral Owens and Mr. Kaminski see TAV and ITV as key to moving logistics into the 21st Century. We have already begun force reduction based on the perceived efficiencies gained from the use of the new systems. Indeed, Admiral Owens' plan, as outlined in his article

"The Emerging System of Systems," is to reduce logistics force structure now to free up resources to develop systems for the future, and accelerate the revolution in military affairs.

Since the logistics community has already begun force reduction in anticipation of new technologies, how can we accelerate the use of the technologies that hold so much promise? How can we take advantage of the efficiencies they offer? Can we define an architecture and develop a system that can rapidly be fielded, and train our personnel in its use? How can we achieve system synergy?

The solutions are at hand, but they involve radical departures from our current ways of doing business. As General Sullivan has said, "...the payoff will go to ...leaders who are bold, creative, innovative and inventive."[8]

The Internet was developed by DoD as a non-hierarchical command and control system as defense against nuclear attack. Even if one part of the system was destroyed, the rest would continue to operate. This power is only beginning to be realized. As COL Merle D. Russ points out in his article "Log Internet," it gives us the opportunity to untether ourselves from our hierarchical, nodal logistics bureaucracies that supported a linear battlefield and move to a the circular, networked organizations of the future. It perfectly supports Admiral Owens' proposed organizational paradigm shift, and allows us to replace our industrial age push logistics with information age pull logistics. In other words, we can replace our large stockpiles (mass) with precision and velocity.

Colonel Russ suggests that, "We have the tools readily available today to replace our existing industrial-age automation systems with a Force XXI capability that will be compatible with our information age Army."[9] In his article, he proposes that we replace our hierarchical

system with a network that ..."bypass(es) nodes that do not need to process the information."[10]
As servers and routers move information to the proper location, command and control can be
exercised from any location that is connected to the net. By asking the computer to key on a few
selected items, items can be managed by exception and precision control can be centrally managed
for the battlefield. The system itself will handle routine requests.

The backbone of the logistics system of systems should be Internet, as Colonel Russ
proposes. However, his system may be too reliant on satellite communication for routine use.
The addition of deployable servers and routers, however, would provide an assured, in-theater
link that could be easily grown and interconnected as the theater grows. Utilizing standard TCIP
protocols, the system could "batch" information to stateside data bases when communications are
at a premium. In-theater transmissions for lateral distribution, pre-alert information and e-mail
could be sent thru the servers without passing back to CONUS, and local command and control
could be exercised by tapping anywhere into the in-theater net. Although not designed as a
tactical system, USAREUR's OPTAV offers a glimmer of this potential. RF interrogators
throughout Germany are tied to fixed regional servers. The network is accessible thru these
servers, or worldwide thru the internet. E-mail and lateral visibility can be easily added. The use
of existing community servers, however, slows transmission time and makes the system
non-deployable. Still, it offers users a glimpse of the potential of networking. Routine work is
untied from reliance on communication thru the Internet with CONUS via DSN, which is
frequently overtaxed and painfully slow.

Key to the issue is the transmission of information. Without assured communication,
logistics will be forced to rely on the stand-alone, nodal systems of the past. In fact, the major

obstacle in developing common systems has been the lack of the ability to communicate with a central data base - thus, information must be stored on site. With the advent of reliable, cheap and readily available commercial systems, however, the logistician can divorce himself from the warfighter's secure communications and rely on central data fusion centers to provide real-time information. Redundancy can be easily provided to eliminate communication hurdles. INMARSAT today provides world wide communication of both voice and data; third world countries are rapidly installing cellular phone systems that can be placed into immediate use. Local telephone systems, Internet nodes, the Army's Mobile Subscriber network and even self installed local wire systems can be easily incorporated into off the shelf PC systems. Success with these systems has already been demonstrated with the Navy's SALTS system.

Battlespace awareness is available today thru Army Total Asset Visibility. Integrating 255 data bases, the system serves a model for the potential of an internetted system. It can locate assets, whether in use, instorage, or in process around the world, and fuse in-transit information with detailed information of detailed sustainment and unit move data.

TAV's cousin, is In-transit visibility, which is currently provided to the Army by a network of interrogators, which can read pocketbook size tags that transmit data over radio frequencies when receiving a wakeup signal from the interrogator. The tag is written, or burned, at the source of supply, and the information is in turn transmitted to a central database. Interrogators are placed at critical choke points, such as APOEs and APODs, to record the passing of the materiel. The data is fused into Army TAV, and customers can either dial in or connect by Internet to see the last location their cargo passed.

The RF technology offers port clearance capability by a data base function that allows the user to set a search parameter (i.e.., boots) and have any tag containing that item report. A strength direction finder on a hand held unit points the user to the cargo's location. He can have the tag report by an audible "beep" to pinpoint it's exact location.

Source data automation is desirable for two reasons - humans are slow and they make mistakes. DLA's Automated Manifest System takes source data directly from the depot's computer and writes it on a credit card sized optical laser card. The card, which provides the same utility as a computer diskette, is virtually indestructible. The data is used by the STARS system for break bulk redistribution and the SSA for automated receipt processing. Developed by VOLPE National Transportation Center, STARS uses AMS cards and bar code scanning to provide source data automation and speed to shipment manifest processing. In effect, STARS "breaks" bulk cargo, redistributes it and assigns it to the most efficient transportation mode.

Mobile tracking systems (MTS) has been in use by the commercial trucking industry for several years. Using GPS and communications equipment, a vehicle can be tracked on a computer map overlay. Data communication can then redirect the shipment as needed. By including an RF interrogator in the system, the truck's cargo can be read to verify its contents.

The Objective Supply Capability (OSC) provides users around the world the capability to access to the "Gateway" that stores the records of most SSA's in the Army. It "skips" the nodal requisitioning process and shaves days off of requisitioning processing time. It also provides feedback for lateral distribution. Colonel Russ sees OSC as "the first glimmering of the information age in CSS automation, but OSC is to the Logistics Internet what a crossbow is to a carbine."[11] Still, it offers real capability today.

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Force projection means movement by a variety of transportation modes. The Logistics Operations Vehicle - Experimental (LOVE), proposed by the author in the lead scenario is a spin-off of vehicles developed by USAMMCE in Pirmasens, Germany, to be used on their frequent deployments. Using standard commo shelters, these units can be easily equipped with all the above systems. In fact, much of the necessary hardware could probably be obtained from DRMO. The beauty of the commo shelter concept is that it can be employed with a variety of transportation platforms, stand alone, and even be placed inside a warehouse. The same system could be used by everyone in theater - at the APOD, SPOD, Central Distribution Management Activity (hub), SSA's - laptops, connected by wireless modems, could be provided to the warfighter at the lowest level of command. With onboard INMARSAT and MTS, the exact location of these vehicles, and thus their supported unit, would be a keystroke away.

If we currently have this technology, what is slowing down our progress? The answer is in our traditional developmental and fielding systems. Mr. Kamanski says that "Sometimes many of us in the acquisition business forget our main aim in life is to field systems"[12] Acquisition processes developed for the industrial age are simply too slow to keep up with the advances in technology. SARSS-O, The Army's Objective Standard Retail Supply System, has been at least five years in development. Change package after change package has been added as commercial industry leaps ahead with new concepts - in fact, the system is just being fielded. When one considers that most of the PC's purchased five years ago are now hopelessly obsolete, we begin to realize the magnitude of the problem. Even worse, we ignore incremental upgrades being made in the civilian sector as we wait for the "objective" system. Another part of the problem is our reliance on unique systems that comply with tightly written MILSPECS. UNIX operating

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systems prevent us from using standard code, as do other upgrades hopelessly tied to legacy systems. As a result, we fly diskettes from one node to another (as was done in Desert Storm) while our children communicate around the world on the Internet.

Most problematic, however, is that we cannot achieve system synergism in today's layered, segmented world. Again, Admiral Owens: "Today, the center of technological acceleration...lies generally in the commercial, non-defense sectors. Our ability to accelerate the fielding of the system of systems, on which we base our future military superiority, thus depends on our capacity to tap into developments taking place for the most part outside the existing DOD laboratory and development infrastructure."[12]

IV. Commercial Systems

Logistics, more than any of the other military sciences, lends itself to using commercial applications. Arguments for applying commercial systems to military logistics come from a variety of sources. Admiral Owens, Rand, and every nearly every sector of leadership argue that commercial systems need to be emulated, copied, or bought outright. It is ironic that while some argue that FEDEX, UPS, and other commercial services cannot serve as models for our systems infrastructure, we increasingly rely on them to perform our peacetime and contingency functions. Just as the revolution in Military Affairs rests on rapid communication, which in turn fosters networking, the increased velocity of our transportation systems make the same concept possible for the actual distribution of materiel.

This concept was recognized in the early 1970's by Frederick W. Smith, CEO of Federal Express. While an economics student at Yale, Smith devised a distribution system that capitalized on the speed of air transportation and the power of technology. Realizing that the computer

industry would require rapid delivery rather than maintaining on site spares, he created a networked system that relied on centralized information management and hub and spoke rather than linear distribution.

To understand hub and spoke distribution, one needs only to look at an airline route map. Passengers are flown from different locations to a hub that consolidates them with other passengers to be flown to another destination. Thus, we may find ourselves flying away from our destination during the first leg of our flight. The airplane's speed, however, compensates for the additional distance. Smith describes the hub as follows: "It operates like a great big telephone switch or a bank clearing house - and by that I mean we bring things from one point into a central location, which we call a hub, and mix it up with all the other items from lots of other cities and collect them all going to a single destination. Now what that allows you to do is connect a lot of different points with relatively few airplanes and trucks."[13] Smith's analogy with telephone switching is important, as he recognized that increased velocity, whether it be for the movement of information or materiel, lends itself to networked systems.

Smith purchased planes, leased trucks, and began operating his hub out of Memphis, Tennessee. He recognized the importance of controlling all aspects of the operation: "Before we got started, for whatever reason, people operated from trucks, they operated from planes, but nobody operated them on an integrated basis."[14]

Having developed an integrated, networked system, Smith developed the information technology necessary to control his system. His sensor, bar codes, are used at every step of the process to identify cargo. The bar code guides the package thru the hub, providing data to automated sorters. At each step in the process, including final delivery, the bar code is scanned,

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reporting (frequently by radio) to a central data base that can be accessed from a PC anywhere in the world by internet of telephone. The sensor, the bar code scanner, reports to a central data base (C4I) and provides the customer battlespace awareness.

Impact on commercial industry has been dramatic. Wal Mart and other major distributors use these same concepts to reduce or eliminate inventory by "just in time" delivery. Smith explains: "What we had to do is come up with a way to handle each and every one of the items we carry as if we were physically putting it under our arm and carrying it to the destination."[15] He adds: "It really doesn't make any difference if the box is in our hands in one of our trucks going fifty miles an hour or one of our planes going 500 miles an hour - if you can keep up with it regardless of wherever it is, with your computer in your office, it's just as good as if you had it in your warehouse."[16]

Smith's achievement of system synergism has revolutionized worldwide distribution and inventory management. Perhaps most impressive of this system is the new SeaLand terminal in Rotterdam. Using hundreds of acres reclaimed from the North Sea, the offload of container ships is run by giant robotic cranes, which loads cargo on remotely guided trailers traveling on a huge circular track as drivers wait in prepositioned shelters. In effect, it is a giant, outdoor hub, using Smith's concepts to move cargo directly from the seaport to the customer. Port clearance problems are eliminated with the hub system by keeping the cargo moving thru the hub instead of using interim storage.

FEDEX captured the civilian market in the 1970's because it recognized that technology and velocity had dramatically changed the way distribution could be managed. It developed sensors, battlespace awareness, and C4I and integrated them into system synergy. Smith's

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remarks about the integration of air and ground transport speak volumes about the need for jointness in logistics.

V. Current Initiatives

While current initiatives toward achieving system synergism and joint logistics are, for the most part, separate, evolutionary and piecemeal, some hold promise for the future. Several are gaining momentum in the face of stiff opposition. COL Paparone's Army Logistician article supporting Joint Logistics was met with a special section in a subsequent issue decrying the concept from the AMC commander. Despite this, a CASCOM thought piece on a Joint SUPCOM at the theater level is beginning to slowly win support among the Army and Air Force. Operation Roving Sands validated at least part of the concept, using ad hoc joint and coalition players in live logistical support of this multinational TMD exercise. Several DLA initiatives, such as AMS and JTAV, may be tangled in bureaucratic fog, but the concepts point in the right direction.

The Army has embraced hub and spoke distribution, and has had a full blown system in USAREUR for the last several years. While it does not achieve the integration between air and ground transport advocated by Mr. Smith, it is a beginning. (It is instructive that the system was put in place by a young Army Transportation Captain who had just completed a year in "Training with Industry" with FEDEX). The CCP at New Cumberland incorporates much of the same technology and practices that are used at the Memphis hub. The Air Forces' AMX (Air Mobility Express) has been developed with this hub concept in mind.

Yet as long as these initiatives are developed in their service specific vacuum and focus only on their particular nodes of the system, they will not achieve system synergy. This

evolutionary approach will simply layer more organizational structure at the management level and add more systems to the battlefield.

VI. Conclusion:

While Admiral Owens says that "conceptual frameworks...are useful only to the extent that they lead to better decisions in allocating resources.", [17] the need to agree on an overarching philosophical construct is self evident. While other concepts like "seamless logistics" may seemingly offer the same solution set, only Admiral Owens' generalized military philosophy develops a basic vision that leads to logical decision making. If we are to be truly revolutionary, we need to have some agreement on the end state. Admiral Owens' model leads us to several inevitable conclusions that should be self evident but have been fogged by evolutionary approaches designed to safeguard proprietary interests. He argues his approach shifts us from competitive force structure discussions to how the services can increase their collective power by interacting in a synergistic "System of Systems." When we understand and accept Admiral Owens' model, movement to this end becomes self-evident. Once we agree on common technical systems, doctrine and concepts, the need for single service agencies diminishes. Even our current system points to the fact that logistics is inherently joint -just as for the warfighter, mission accomplishment is impossible without the active participation of each of the services.

The concept of supported CINC for logistics has already been partially introduced in the form of TRANSCOM. The job needs to be finished by creating a CINC for distribution. Unlike TRANSCOM, however, it cannot be a patchwork of service agencies. It needs to be constructed from the conceptual base of system synergism and the application of modern commercial business practices. There are other organizational alternatives toward developing joint logistics - they may

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achieve the same end. The ways we use to develop synergism are less important than the fostering its acceleration.

We need to adopt principles of networking - both in technology and in distribution. Networking is a way of life in the commercial world. Offices are linked together thru networked servers, and can be tied together thru the Internet. In order to do this, we need to scrap the current STAMIS concept and adopt commercial PC's and software linked to regional servers and a central data base. In turn, this information management system needs to control a networked, automated distribution system. A successful hub operation, using source data automation and automatic identification technology can minimize two chronic problems of distribution -port clearance and a broken priority system. Reduced mass eliminates the first, and increased velocity the need for the second.

We need to recognize that this synergistic network systems with advanced communication blurs the distinction between the tactical, operational and strategic. The NCA can make immediate tactical decisions, and the tactical commander can make decisions with strategic implications. This argues, then, for centralized control and decentralized execution - in logistics, we need to feel comfortable with the fact that the tactical logistician can directly interact with the strategic level, and that the strategic logistician can have a direct and immediate impact on the battlefield.

Push vs. pull logistics is a classic problem in military logistics. Ultimately, it is a problem of velocity and communication. When communications were slow, and the time it took to get supplies to theater even slower, we resorted to guessing what would be needed in theater a month or more ahead of the actual request. Pull logistics could only be realistically accomplished from

local stockpiles of pushed items. Today, the distinction blurs. With an internetted process, the strategic logistician can gain visibility of the tactical commanders stocks and more intelligently push supplies. Conversely, the need for this will diminish as instant communication and fast delivery will make push unnecessary. When the strategic logistician can have visibility over the entire theater and redistribute, the distinction may no longer be necessary.

While movement toward truly joint logistics may be years in the future, coordinated movement toward a joint logistics systems infrastructure is within the realm of near term possibility. In fact, as shared systems are developed and the services obtain visibility over each other activities, the obvious advantages may speed the development of a fully joint system. The efficiencies gained from reduced order to ship time, resultant reduced inventories, increased lateral distribution and increased customer confidence should more than pay for the initial expenditures of systems development. We need to be careful, however, about force structure and funding reductions. Precision, rapid delivery will increase, not diminish, the need for ground transportation. Hub and Spoke distribution and discrete deliveries involve more, not less, ground delivery platforms. It requires a greater number of small, versatile delivery platforms, which in turn means an increase in personnel. Hubs require 24 hour a day operations to be successful, and need to be staffed robustly. Equipment reliability is essential. Most of our current delivery platforms, both air and ground, measure their age in decades. Real savings in the form of inventory reduction will occur, but it would be a mistake to see this as found money for the warfighter. For the system to be successful, these savings must be recapitalized into modern equipment and training personnel in its use.

Can logisticians accelerate the move forward, as Admiral Owens argues? Absolutely.

However, the path will be will not be an easy one. In the 1995 DOD Logistics Strategic Plan, Mr.

Kamanski states that ..."an attempt to establish a DoD logistics technology council was

unsuccessful."[18] Competition for resources among the services will undoubtedly become more

acute in the logistics area. Admiral Owens himself proposes the elimination of logistics units

because of the promise of in-transit visibility. Resistance to change, however, will merely delay

our movement toward system synergy. We owe the warfighter the best system we can provide,

subjugating proprietary concerns to this end. Once the die is cast and movement becomes

inevitable, the transition can be much faster and less painful than many think.

ENDNOTES

1.   David Warren, interviewed on "NBC Nightly News," N.B.C. telecast, 28 FEB 96, Bob Kur, Interviewer.

2.   "NBC Nightly News", N.B.C. telecast, 28 FEB 96, Bob Kur, Narrator.

3.   Briefing Chart, "Army Distribution is Complex and Segmented," (unpublished chart prepared at the Combat Service Support Battlelab, 1995)

4.   "NBC Nightly News", 28 FEB 96.

5.   Paul G. Kaminski, "The Revolution in Defense Logistics," Defense Issues, Volume 10, Number 107. From prepared remarks to the 12th National Logistics Symposium and Exhibition, Alexandria, VA, Oct. 31, 1995.

6.   William A. Owens, "The Emerging System of Systems," Military Review, (May-June 1995): 17.

7.   Kevin Donlin (feedback@fedex.com), "FEDEX" electronic mail message to John Bucher (bucherj@pa.net), 21 February 1996.

8.   Owens, "The Emerging System of Systems," 15.

9.   Merle D. Russ, "Log Internet" Army Logistician, (March-April 1995): 6.

10.   *Ibid*, 5.

11.   Paul G. Kaminski, "Bad Day in Baghdad" Defense 95, Issue 6, 16.

12.   Owens, "The Emerging System of Systems," 18

13.   Fred Smith, interviewed on The Learning Channel telecast "How'd They Do That?", 19 Mar 1996, Dorothy Lucey, Narrator.

14.   *Ibid.*

15.   *Ibid.*

16.   *Ibid.*

17.   William A. Owens, "The Emerging System of Systems," Military Review, (May-June 1995): 17.

18.   Office of the Deputy Under Secretary of Defense (Logistics), <u>Department of Defense Strategic Plan Edition 1995,</u> Paul G. Kamanski, Deputy Under Secretary of Defense, (Acquisition and Technology), (The Pentagon, Washington, D.C. July 17, 1995), 11.

BIBLIOGRAPHY

Akin, George C. "Battlefield Distribution," Army Logistician,
(January - February 1996): 6-7.

"Army Distribution is Complex and Segmented," United States Army Combined Arms Support
Command Briefing Chart, Combat Service Support Battlelab, 1995.

Bates, James C. and Kropp, Gregory W. "Objective Supply Capability," Army Logistician,
(May-April 1996): 36-37.

"Battlefield Array," United States Army Combined Arms Support Command Briefing Charts,
Logistics Automation Directorate, n.d.

"Battlefield Distribution Force Design Update," United States Army Combined Arms Support
Command Briefing Charts, n.d.

Donlin, Kevin (feedback@fedex.com), "FEDEX" electronic mail message to John Bucher
(bucherj@pa.net), 21 February 1996.

Dumond, J., Eden, R. and Folkeson, J.R. Velocity Management: An Approach for Improving the
Responsiveness and Efficiency of Army Logistics Processes. Rand Corporation, 1995.

Emery, James S. "Going Purple in the COMMZ," Army Logistician, (September-October 1995):
12-13

Kaminski, Paul G. "Bad Day in Baghdad" Defense 95, Issue 6, (1996): 16-19.

Kaminski, Paul G. "The Revolution in Defense Logistics," Defense Issues,
Volume 10, Number 107. From prepared remarks to the 12th National Logistics
Symposium and Exhibition, Alexandria, VA, Oct. 31, 1995.

Letter, COL Gerald K. Johnson, United States Army Training and Doctrine Command Systems
Manager, "CSS Automation Architecture with attachments, to The United States Army
Deputy Chief of Staff for Operations and Plans and the United States Army Deputy Chief
of Staff Logistics, 29 Jan 1996.

"NBC Nightly News", N.B.C. telecast, 28 FEB 96, Bob Kur, Narrator.

Office of the Deputy Under Secretary of Defense (Logistics), Department of
Defense Strategic Plan Edition 1995, Paul G. Kamanski, Deputy Under Secretary of
Defense, (Acquisition and Technology), The Pentagon, Washington, D.C. July 17, 1995.

Owens, William A. "The Emerging System of Systems," <u>Military Review</u>, (May-June 1995): 15-19.

Paprone, Christopher. "Case for A Unified Logistics Plan," <u>Army Logistician</u>, (March-April 1995): 2-6.

Russ, Merle D. "Log Internet" <u>Army Logistician</u>, (March-April 1995): 6-8
Salomon, Leon E. "Open Letter on a Unified Logistics Command." <u>Army Logistician</u>, (September-October 1995): 8-11.

Smith, Fred, CEO, FEDEX, interviewed on The Learning Channel telecast "How'd They Do That?" , 19 Mar 1996, Dorothy Lucey, Narrator.

Spyker, William W. "Europe's Hub - and - Spoke Disribution System." <u>Army Logistician</u>, (January-February, 1994): 25-27.

Toffler, Alvin and Toffler, Heidi. <u>War and Anti-War</u>. Boston, New York, Toronto and London: Ltttle, Brown and Company, 1993.

"The Army Strategic Logistics Plan." Logistics Integration Agency, Alexandria, VA, n.d.

"USAREUR ITV DB Server Home Page (OPTAV)" (http://144.170.190.8/). Internet Home page, 12 April 1996.

White, Christine. "On-Road, On Time, and On-Line." <u>Byte</u>, (April, 1995): 60-66.